

The burden of periodontal disease

Butt, Kasim; Butt, Razia; Sharma, Praveen

DOI:

[10.12968/denu.2019.46.10.907](https://doi.org/10.12968/denu.2019.46.10.907)

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Document Version

Peer reviewed version

Citation for published version (Harvard):

Butt, K, Butt, R & Sharma, P 2019, 'The burden of periodontal disease', *Dental Update*, vol. 46, no. 10, pp. 907-913. <https://doi.org/10.12968/denu.2019.46.10.907>

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Title: The Burden of Periodontal Disease

Author's name, degree and affiliations:

Mr Kasim Butt, BDS, MJDF (RCS Eng), PgCert Dent Ed

Specialty Registrar in Restorative Dentistry

Sheffield Teaching Hospitals NHS Foundation Trust

Sheffield, UK

Miss Razia Butt, BDS, MFDS (RCPS Glasg)

Dental Core Trainee in Restorative Dentistry

Birmingham Community Healthcare NHS Foundation Trust

Birmingham, UK

Dr Praveen Sharma, BDS, MJDF (RCS Eng), FHEA, PhD

Clinical Lecturer in Restorative Dentistry

University of Birmingham, School of Dentistry

Birmingham, UK

Title: The Burden of Periodontal Disease

Abstract

Periodontal disease is the most common chronic inflammatory disease seen in humans. It is a major public health concern, and affects approximately 10.8% or 743 million people aged 15-99 worldwide. Trends such as the rise of smoking in developing countries, the obesity and diabetes epidemic, coupled with an ageing population with greater tooth retention, are all likely to further increase the burden of periodontitis in the UK and worldwide. Consequences of periodontitis include hypermobility of teeth, tooth migration, drifting, and eventual tooth loss. Tooth loss can directly affect the quality of life of a person in terms of reduced functional capacity, self-esteem and social relationships.

Clinical Relevance Statement

This manuscript reports the prevalence of periodontal disease in the UK and worldwide along with the consequences of periodontitis. The importance of timely diagnosis to avoid litigation is discussed, as is the importance of effective management of periodontitis in order to improve the patients oral-health related quality of life.

Objective Statement

The reader should be aware of the global prevalence of periodontal disease and the consequences of periodontitis. The reader should be informed of the importance of timely diagnosis and appropriate management of periodontitis to improve the patient's oral health-related quality of life.

Introduction

Periodontal disease is the most common chronic inflammatory disease seen in humans. It is a major public health concern, affecting nearly half of adults in the United Kingdom (Mendis, Davis, & Norrving, 2015). Consequences of periodontitis include tooth loss, compromised speech, disability, masticatory dysfunction, poor nutritional status and a reduced quality of life (Chapple, 2014).

Periodontal disease is a non-communicable disease (NCD) that shares social determinants and risk factors with other chronic inflammatory diseases such as cardiovascular disease (Dietrich, Sharma, Walter, Weston, & Beck, 2013), type II diabetes (Chapple & Genco, 2013), chronic kidney disease (P. Sharma et al., 2014) and other chronic diseases (Linden & Herzberg, 2013). Risk factors such as tobacco smoking, obesity, poor nutritional status and physical inactivity have all been associated with an increased risk of periodontitis (Chapple et al., 2017). Trends in these risk factors such as the rise of smoking in developing countries, combined with the obesity and diabetes epidemic is likely to further increase the incidence and prevalence of periodontitis.

Prevalence of Periodontal Disease

Over the last five decades, various oral health initiatives have been tested and employed in many populations around the world with the aim of preventing and treating periodontitis. Despite this, a large part of the world's population still suffers with periodontal disease (Marcenes et al., 2013).

This paper will explore the prevalence of periodontitis from UK and worldwide perspective.

UK perspective

Data from the Adult Dental Health Survey conducted in 2009/2010 (Steele & O' Sullivan, 2011) showed that periodontal pocketing remains prevalent in the United Kingdom (Table 1).

Approximately 45% of dentate adults (16 years and older) were reported to have at least one

periodontal pocket $\geq 4\text{mm}$. In the 2009 survey, most of the individuals with pocketing greater than 4mm had relatively mild levels of disease with pocket depths between 4mm and 6mm. Some dentate adults had at least one periodontal pocket of 6mm or deeper (Table 1) (White et al., 2012). Figure 1 demonstrates the periodontal condition of dentate adults of different age ranges, with 55-64-year-olds most affected. Given the aging population in the UK with patients retaining teeth for longer, in the future, the prevalence of periodontitis in the UK is likely to increase. Men were shown to have a worse periodontal condition compared to women (Figure 2). Comparisons between the periodontal condition of dentate adults in England, Wales and Northern Ireland can be seen in Figure 3.

Table 1 - Adult Dental Health Survey conducted in 2009/2010 showing the percentage of adults with Periodontal Pocketing in the United Kingdom (Steele & O' Sullivan, 2011)

Pocket Depth	Percentage of Dentate Adults (%)
Pocketing $<4.0\text{mm}$	55
Pocketing 4mm – 5.5mm	37
Pocketing 6mm – 8.5mm	7
Pocketing 9mm +	1

Figure 1 – A chart showing the percentage of population of a certain age group with different pocket depths. Estimates in the 85 years and over category may be unreliable and any analysis using these figures may be invalid (White et al., 2012).

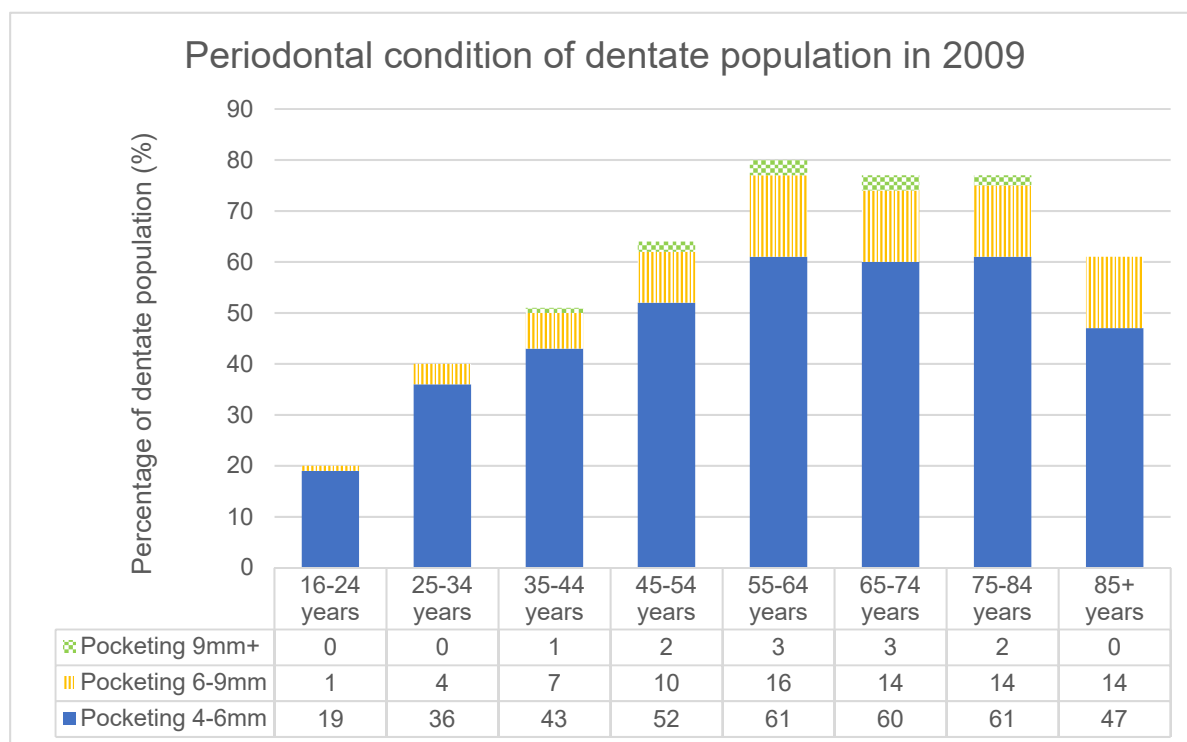


Figure 2 – A bar chart comparing the periodontal condition of men and women as a percentage of the dentate population (White et al., 2012).

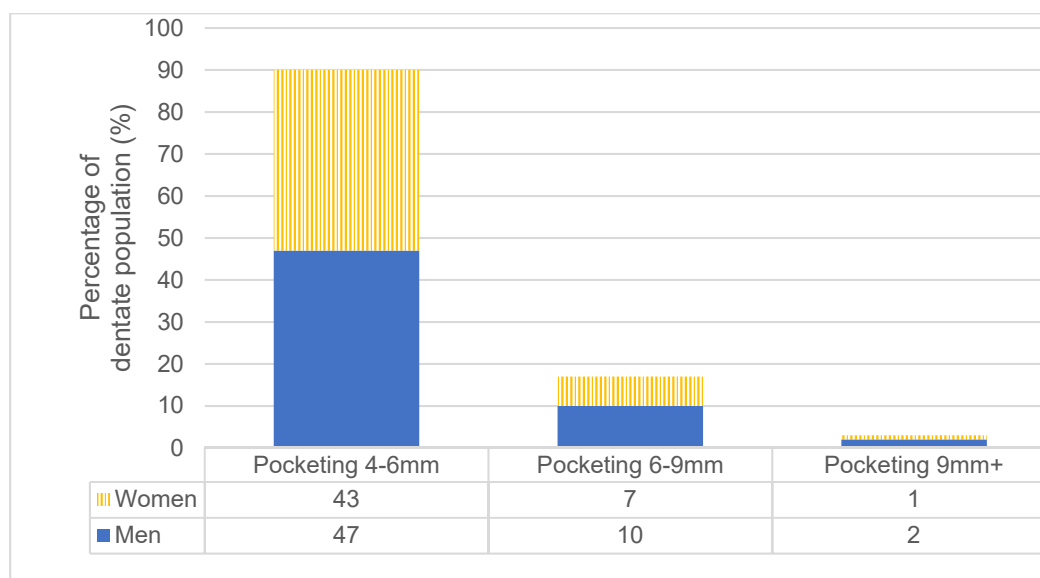


Figure 3 - A bar chart demonstrating the periodontal condition in England, Wales and Northern Ireland as a percentage of the dentate population (White, Pitts, Steele, Sadler, & Chadwick, 2011).

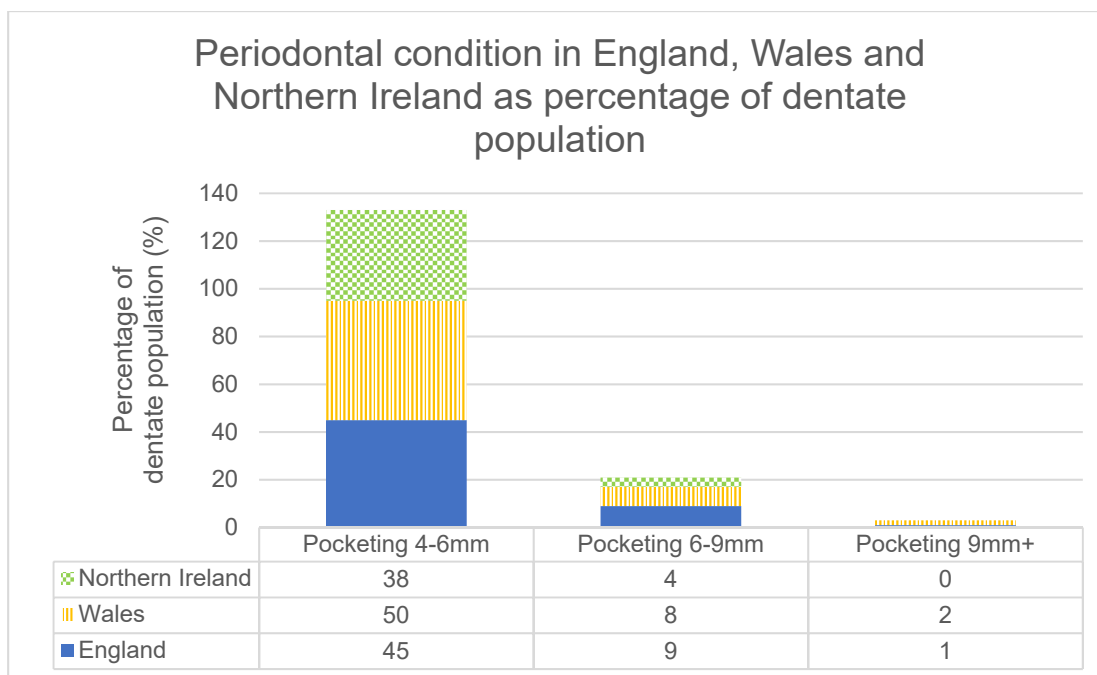
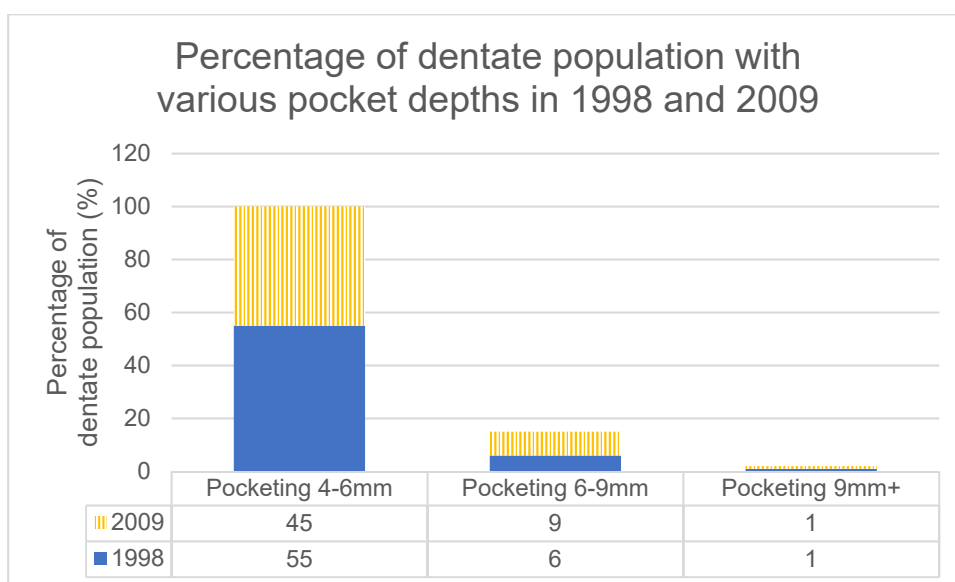


Figure 4 - Percentage of dentate population with various pocket depths in 1998 and 2009 (White et al., 2012).



Global perspective

The Global Burden of Disease 2010 study systematically produced comparable estimates between 1990 and 2010 of the burden of 291 diseases and injuries. A systematic review as part of this study investigated the global burden of periodontitis (Kassebaum et al., 2014). For the purposes of this review, the authors used a pragmatic case definition of severe periodontitis defined as either a Community Periodontal Index of Treatment (CPITN) score of 4 or a clinical attachment level (CAL) of more than 6mm or a probing depth (PD) of more than 5mm. The authors reported that in 2010 severe periodontitis was the sixth most prevalent disease and that it affected 10.8% or 743 million people aged 15-99 worldwide (Kassebaum et al., 2014). The age-standardized prevalence and incidence of severe periodontitis in the global population had remained static over the previous two decades (Table 2). The age-standardized prevalence and incidence was similar for males, and females. The prevalence of severe periodontitis increases with age, with a steep increase between the third and fourth decades of life, reaching peak prevalence at the age of 40 and remaining stable thereafter (Kassebaum et al., 2014).

The lowest prevalence of severe periodontitis in 2010 has been noted as being in Oceania (4.5%), and the highest prevalence of severe periodontitis has been noted as being in Southern Latina America (20.4%) (Kassebaum et al., 2014).

Table 2 - Comparison of the Global Age-Standardized Prevalence and Incidence Rate of Severe Chronic Periodontitis in 1990 and 2010 (Kassebaum et al., 2014).

	Year	
	1990	2010
Prevalence per 100 population*	11.2 (10.4-11.9)	11.2 (10.5-12.0)

Incidence per 100,000 person-years*	696 (604-808)	701 (599-823)
*Values displayed with 95% confidence intervals		

Consequences of Periodontitis

Accumulation of dental biofilm as a result of inadequate self-performed oral hygiene measures such as tooth brushing and the use of inter-dental cleaning aids, accounts for the initiation and progression of periodontal disease. In susceptible individuals, this biofilm, if not well controlled, may become dysbiotic. Dysbiosis initiates and sustains the disease process which is characterized by the inflammatory destruction of the tooth-supporting apparatus and alveolar bone (Darveau, 2010).

Burden of Periodontitis to the patient or society

In the early stages, clinical signs of periodontitis include gingival bleeding, recession of the gingival margin and halitosis. Once there has been significant periodontal attachment loss, signs and symptoms can include hypermobility of teeth, tooth migration, drifting, and eventual tooth loss. Tooth loss can directly affect the quality of life of a person in terms of reduced functional capacity, self-esteem and social relationships (Chapple, 2014).

The relatively “silent” nature of the early stages of periodontitis in terms of symptoms and the lack of awareness of periodontal health has led to many patients seeking symptom-driven care often in the latter advanced stages of disease. The impact on quality of life is also greater with increasing extent and severity of periodontal disease (Buset et al., 2016). In 2018, Sharma et al (Praveen Sharma, Yonel, Busby, Chapple, & Dietrich, 2018) analysed data from 14,620 patients, gathered from

233 non-specialist dental practices across the UK and found that worse periodontal health was associated with patient reported oral pain/discomfort, restrictions in diet and unhappiness with appearance. Researchers found that the probability of reporting oral pain and diet restrictions was highest in patients whose periodontal health parameters indicated current disease and improved in those whose periodontal health parameters indicated historic or treated disease. This effect was not seen in patients reporting an unhappiness with their appearance, indicating that periodontal therapy may potentially benefit patients' reporting of pain and diet restrictions but is might not benefit patients' reporting of unhappiness with their appearance. This is potentially due to the aesthetic compromise that can be seen following successful periodontal therapy (Sharma et al. 2018).

Periodontitis disproportionately affects the vulnerable segments of the population and is a source of social inequality (Jin et al., 2011). Patients with periodontal disease have been found to have poorer oral health-related quality of life compared to periodontally healthy patients (Jin et al., 2011).

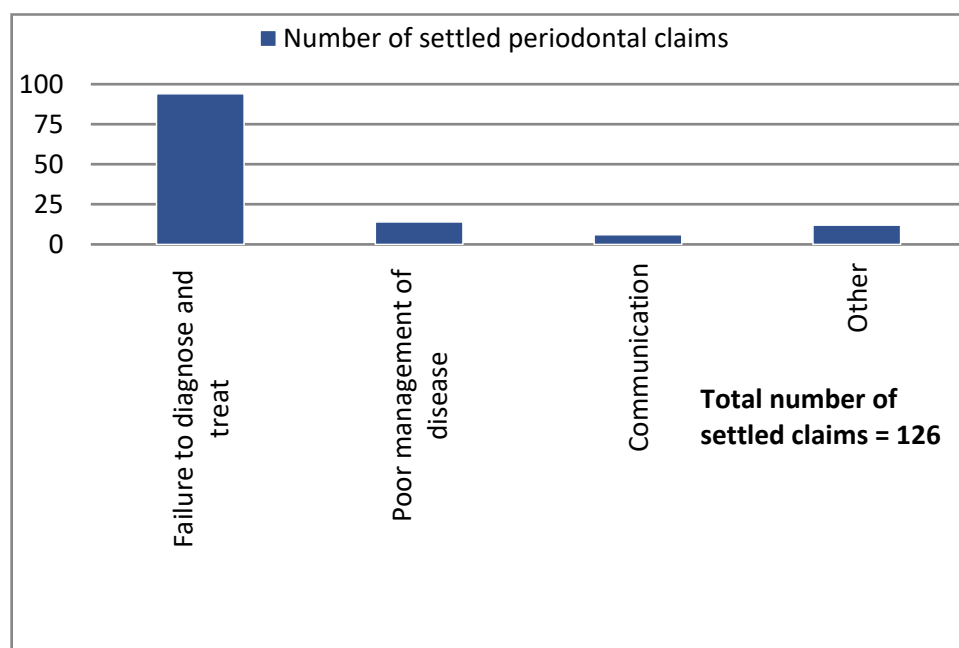
Periodontitis is an escalating burden to the healthcare economy. The global cost of lost productivity from severe periodontitis has been estimated to be 54 billion USD/year (Tonetti, Jepsen, Jin, & Otomo-Corgel, 2017). In the UK in 2008, the estimated cost was £2.8 billion (Chapple, 2014).

Periodontal treatment in patients has demonstrated an improvement in quality of life (Shanbhag, Dahiya, & Croucher, 2012). Data from US based insurance companies on health economic savings of managing periodontitis in patients with different co-morbidities has shown an annual health cost saving of \$2183 (25.4%) per patient for patients with heart disease and \$2831 (34.7%) for those with stroke (Tonetti et al., 2017). Annual overall savings per patient have been estimated to be \$1020 after periodontal care, irrespective of comorbidity, largely due to a reduction in hospital admissions and a reduction in emergency room activity (Tonetti et al., 2017).

Periodontal Litigation

Periodontitis is diagnosed via a full mouth comprehensive periodontal assessment (Dietrich et al., 2019). Periodontal probing should be a key component of regular dental visits (Matthews, 2014). A missed or delayed diagnosis can result in a reduced prognosis for teeth, an increased cost for disease management and also an increased risk of litigation (Tonetti et al., 2017). Failure to diagnose periodontal disease appropriately is associated with one of the leading causes of professional litigation in many industrialised countries (Zinman, 2001) (Figure 5). The DDU analysed the reasons for, and outcome of, 170 claims involving periodontal disease that were closed between 2008 and 2012. They found that they settled 126 (74%) of these claims on behalf of members and paid out over £2.8 million in compensation and a similar amount in legal fees. Not only was there an increased number of claims overall between 2008 to 2012, but also the average compensation payout rose from £21,425 in 2008 to £31,607 in 2012 (Briggs, 2014). Clearly, timely diagnosis of periodontal disease, effective communication with the patient, and management of the disease in line with evidence-based guidelines is important to avoid litigation.

Figure 5 - A bar chart to show the primary reasons for settled periodontal claims.²³



Conclusion

Periodontitis is a common, preventable disease that can be treated at a relatively low cost to the healthcare economy. The global burden of periodontal diseases remains high and trends in risk factors, improved tooth retention, and an ageing population are likely to bear further increases. The need to provide high quality periodontal treatment is only expected to rise in the future.

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